PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 78128 UCK/TR	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/DK 03/00570	International filing date *(day/month/year)* 02.09.2003	Priority date *(day/month/year)* 02.09.2002
International Patent Classification (IPC) or both national classification and IPC C08B37/06		
Applicant CP KELCO APS et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22.03.2004	22.10.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Gerber, M Telephone No. +49 89 2399-8528

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK 03/00570

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-59 as originally filed

Claims, Numbers

1-30 received on 10.09.2004 with letter of 09.09.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-15
	No:	Claims	16-30
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-30
Industrial applicability (IA)	Yes:	Claims	1-30
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US-A-5 656 734 (EHRLICH ROBERT M) 12 August 1997
D2: GB 474 475 A (PFEIFER & LANGEN) 2 November 1937
D3: WO 99 10384 A (ANTILA JUHANI ;SOHKAR OY (FI); KUUSISTO JUHANI (FI); LINDQVIST IRM) 4 March 1999
D4: WO 00 39168 A (HERCULES INC) 6 July 2000
D5: US-B1-6 261 626 (BUCHHOLT HANS CHRISTIAN ET AL) 17 July 2001
D6: GB 302 734 A (PECTINERIE DU KERVOR) 22 April 1930
D7: US-A-2 165 902 (PHILIP BLISS) 11 July 1939
D8: GB 565 700 A (SADRIK INC) 23 November 1944
D9: WO 91 15517 A (GRINDSTED PROD AS) 17 October 1991

1. Article 33(2) PCT

Remarks: a. It should be noted that a claim for a product for a particular use, as it is the case for **claims 16-24**, is in fact directed to a product which is suitable for the stated use (see the Guidelines III-4.8 PCT).A known product which is per se the same as the substance defined in the claim and which is in a form which would render it suitable for the stated use, deprives the claim of novelty.
b. The use of parameters not mentioned in the prior art to characterise a product, as it is the case in claims 25-30, does not allow a meaningful comparison with said prior art and might disguise lack of novelty.

1.1. The disclosure of D1 anticipates the subject-matter of **claims 16-30**.

D1 is directed to the hydrolysis and extraction of the pectin from plant starting material like citrus peel, especially orange peel, apple, sugar beet, sunflowers (see column 4, lines 61-64) in raw, dried or processed form (see column 5, line 5) for use in foodstuffs like bread dough, fruit for yoghurt, yoghurt, jams, fruit spreads, confections (see column 7, lines 28-32) or animal feed (see column 3, line 14). If the material is not used when fresh, it can suitably be treated to deactivate pectic enzymes which can degrade the pectin and pectocellulosic products (see column 5, lines 11-14).
According to D1, the natural pH of washed or dried plant tissue such as citrus peel is in the range from 3,7 to 4,3, which is sufficient to effect hydrolysis and break down the

plant tissue bound together by pectin (see column 4, lines 31-35, and example 4) without the need for addition of mineral or organic acid to lower the pH of the plant tissue for hydrolysis and extraction of pectin. The hydrolysing step is performed at an elevated temperature, above 65°C and preferably between 85 and 90°C (see column 5, lines 39-41).

1.2. D2 is novelty-destroying for the subject-matter of **claims 16-19 and 23-30**.

D2 discloses the extraction of pectin from turnips or beets like sugar beet in damp or dry condition at temperatures ranging from 30 to 80 °C with water acidified with sulfuric acid (see page 1, lines 12-23, and the example) for use in foodstuff (see page 2, lines 102-108).

1.3. The subject-matter of **claims 16-19 and 23-30** is not novel over D3.

D3 describes a biotechnical pre-treatment of sugar beet pulp by reducing its pH to 4, by mixing the pulp with an acid solution from formic acid, lactic acid or acetic acid and/or mixtures thereof (see page 2, lines 26-30) at temperatures around 60°C, the thus obtained pulp having a pH of 3,5 to 4,5 (see page 3, lines 2-33).

1.4. The novelty of the subject-matter of **claims 16-30** is taken away by D4.

D4 deals with the extraction of pectin from citrus peel such as lemon, orange, grapefruit, lime, apples, sugar beets and sunflower heads (see page 7, lines 19-21) by contact with a weakly acidic solution at a pH value of 2,5 to 4,0, preferably 3,0 to 3,3 (see page 7, line 24 - page 8, line 14, and page 28, lines 1-3), at temperatures ranging from 70 to 90°C (see page 9, line 25 - page 10, line 8), thus separating calcium-sensitive pectin and non-calcium sensitive fractions. The obtained products are used as foodstuff (see page 17, line 28 - page 18, line 5).

1.5. The subject-matter of **claims 1-15** is novel over the available state of the art.

2. Article 33(3) PCT

D3, which is considered to represent the most relevant state of the art, discloses a biotechnical pre-treatment of sugar beet pulp in order to obtain pulp which is stable for months in air-tight storage and can further be used for hydrolysis or extraction of pectin and related products, from which the subject-matter of claim 1 differs in that the pectin

containing plant starting material is a fruit starting material.

The problem to be solved by the present invention may therefore be regarded as to provide an alternative process for the pre-treatment of pectin-containing plant starting material in order to stabilise it before hydrolysis or extraction of pectin at a later stage.

The use of fruit starting material like citrus fruits and apples as pectin containing plant starting material cannot be considered as an inventive alternative to sugar beet in the absence of an effect associated with this selection. The skilled person would have tried to apply the teachings of D3 to other sources of pectin in order to overcome the problem of limited availability thereof over the whole year.

3. Industrial applicability

The subject-matter of present **claims 1-30** appears to comply with the requirements of industrial applicability as stipulated in Article 33(4) PCT.

Claims

1. A method for controlling pectin esterase activity in a pectin containing plant starting material before extraction of pectin from said pectin containing plant starting material comprising the steps of: obtaining a pectin containing plant starting material, contacting said pectin containing plant starting material with an acidified water having a pH of between 3.2 – 3.9 at a temperature below 90 C and recovering a treated pectin containing plant starting material

2. The method of claim 1, wherein the acidified water has a pH of between 3.4 – 3.7.

3. The method of claim 1, wherein the acidified water is acidified using an inorganic or organic acid.

4. The method of claim 1, wherein the acidified water is acidified using an inorganic acid selected from hydrochloric acid, sulfuric acid, sulfur dioxide, and nitric acid.

5. The method of claim 1, wherein the acidified water is acidified using an organic acid selected from the group consisting of citric acid, oxalic acid and acetic acid.

6. The method of claim 1, wherein the acidified water is acidified using a buffer system being capable of maintaining the pH of the acidified water within the range of between 3.2 – 3.9.

7. The method of claim 5, wherein the buffer solution is capable of maintaining the pH of the acidified water within the range of between 3.4 – 3.7.

8. The method of claim 6, wherein the buffering system is selected from the group comprising hydrochloric acid/ disodium hydrogen-citrate, glycine/hydrochloric acid,

potassium hydrogen phthalate/ hydrochloric acid, citric acid/sodium citrate, and sodium acetate/ acetic acid.

9. A method of claim 1, wherein said pectin containing plant starting material is contacted with an acidified water at a temperature of ≤70 C, more preferably at a temperature of ≤50 C and especially ≤30 C .

10. A method of claims 1 – 9, further comprising the step of drying the treated pectin containing pectin containing plant starting material to produce a dried treated pectin containing pectin containing plant starting material.

11. The method according to claims 1-10 wherein the pectin containing plant starting material is selected from the group consisting of citrus fruits, apples and beets

12. The method according to claims 1-10 wherein the pectin containing plant starting material is selected from the group consisting of remains from the manufacturing of soy protein, linseed, flax, aloe and sunflower buttons.

13. A method according to claims 1 – 11, wherein the pectin containing plant starting material comprises citrus fruits.

14. A method according to claim 13, wherein the pectin containing plant starting material comprises orange.

15. A method according to claim 11, wherein the pectin containing plant starting material comprises apples

16. A method according to claim 10, wherein the pectin containing plant starting material comprises a vegetable.

17. A method according to claim 16, wherein the pectin containing plant starting material comprises beet.

18. A method according to claim 17, wherein the beet is sugar beet.

19. A treated pectin containing plant starting material made according to claims 1 – 18 for use in extraction of pectin.

20. The treated pectin containing plant starting material of claim 19, wherein the treated pectin containing plant starting material exhibits a pH of below 4.5 when extracted with deionized water.

21. The treated pectin containing plant starting material of claim 20, wherein the treated pectin containing plant starting material exhibits a pH of below 4.0 when extracted with deionized water.

22. The treated pectin containing plant starting material of claim 21, wherein the treated pectin containing plant starting material exhibits a pH of between 4.0 and 3.5 when extracted with deionized water.

23. The treated pectin containing plant starting material of claim 19, wherein the treated pectin containing plant starting material comprises citrus peel.

24. The treated pectin containing plant starting material of claim 23, wherein the treated pectin containing plant starting material comprises dried citrus peel.

25. The treated pectin containing plant starting material of claim 24, wherein the treated pectin containing plant starting material comprises dried orange peel.

26. A treated pectin containing plant starting material made according to claims 1 – 18 for use as animal feed.

27. A treated pectin containing plant starting material made according to claims 1 – 18 for use as an ingredient in foodstuffs.

28. A pectin, characterized by the molecular weight of said pectin being up to 50% higher than the molecular weight of a pectin obtained from extracting a similar but non-treated pectin containing plant starting material, obtainable by extraction from a pectin containing plant starting material treated by the method according to claims 1 –18.

29. The pectin according to claim 28, characterized by the molecular weight of said pectin being 10 – 40% higher than the molecular weight of a pectin obtained from extracting a similar but non treated pectin containing plant starting material.

30. The pectin according to claim 29, characterized by the molecular weight of said pectin being 15 – 30% higher than the molecular weight of a pectin obtained from extracting a similar but non treated pectin containing plant starting material.

31. A pectin, characterized by a ratio between the calcium sensitivity of said pectin and the calcium sensitivity of a pectin extracted from a similar, but non-treated washed pectin containing plant starting material in the range 0.90 – 1.40, obtainable by extraction from a pectin containing plant starting material treated by the method according to claims 1 –18.

32. The pectin according to claim 31, characterized by a ratio between the calcium sensitivity of said pectin and the calcium sensitivity of a pectin extracted from a similar, but non-treated pectin containing plant starting material in the range 0.90 – 1.20.

33. The pectin according to claim 32, characterized by a ratio between the calcium sensitivity of said pectin and the calcium sensitivity of a pectin extracted from a

similar, but non-treated pectin containing plant starting material in the range 0.90 – 1.10.

34. The treated pectin containing plant starting material of claim 19 wherein the treated pectin containing plant starting material comprises dried orange peel.

35. The treated pectin containing plant starting material of claim 19 wherein the treated pectin containing plant starting material comprises dried orange peel.